Polmaddie2 User Manual

Issue – 1.0

Foreword

PLEASE READ THIS ENTIRE MANUAL BEFORE PLUGGING IN OR POWERING UP YOUR POLMADDIE2 BOARD.
PLEASE TAKE SPECIAL NOTE OF THE WARNINGS WITHIN THIS MANUAL.

Trademarks

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Polmaddie2 is a trademark of Enterpoint Ltd.

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Introduction

Welcome to your Polmaddie2 board. Polmaddie is Enterpoint's low cost product range that offers an economical way to begin programming with CPLDs and FPGAs.

The aim of this manual is to assist in using the main features of Polmaddie2.

The Polmaddie board comes in several variants based on different devices. Polmaddie2 is based on an Altera EPM3128ATI144-7 CPLD.

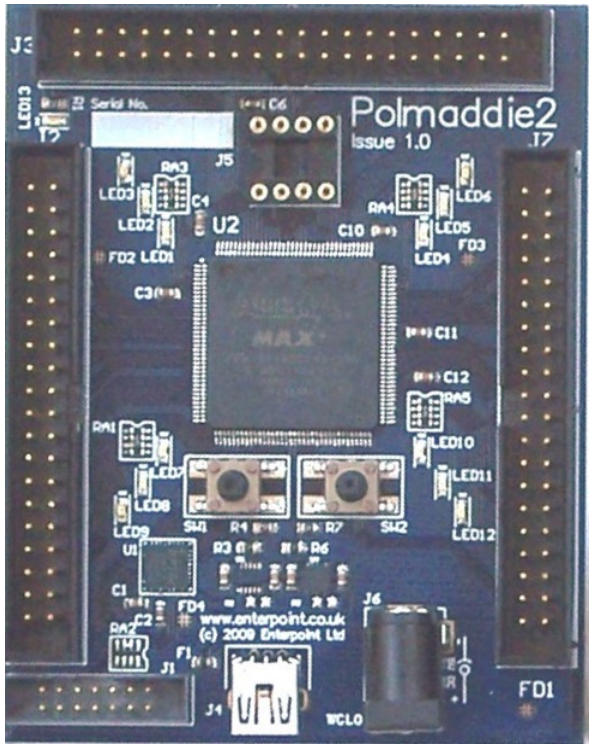


Figure 1 – Polmaddie2 Board

Finding Your Way Around

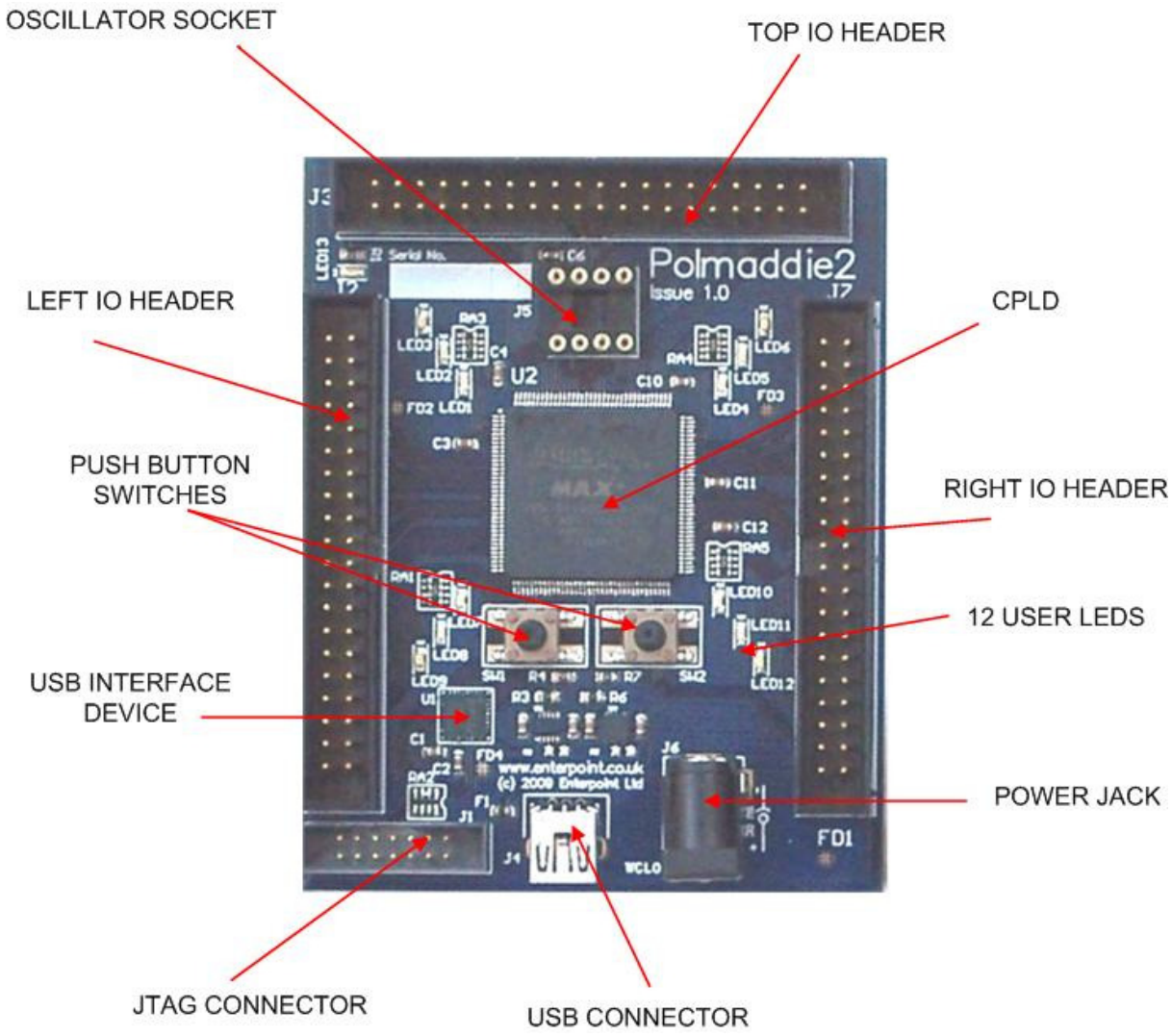


Figure 2 – Polmaddie2 Features

Getting Started

Your Polmaddie2 will be supplied pre-programmed with a 'traffic lights' test design. The test design will allow the user to determine that the LEDs and the push button switches of the Polmaddie2 board are working. To use this test you must do the following:

(1) Apply power to the Polmaddie2 board, either by connecting a 5V power supply to the 2.1mm jack socket or by plugging a cable into the USB socket, either from a USB power supply adapter or a PC. The current consumed by the Polmaddie2 running the test program is approximately 60mA.

(2) The LEDs should light in a 'traffic lights' sequence. There is also Power indicator LED which will light to show that power is present and the 3.3V regulator is working.

Polmaddie2 Features

Power Input

Polmaddie2 is powered either by connecting a 5V power supply to the 2.1mm jack socket or by plugging a cable into the USB socket, either from a USB power supply adapter or a PC.

The 5V supply is used to power the USB interface and to supply the regulator which produces 3.3V to power the CPLD, the LEDs and the oscillator. 3.3V is also available on pin 2 of each of the IO headers. If you decide to use this as a source of power for external circuitry please remember that the maximum total power available from the 3.3V Regulator is 1 Amp.

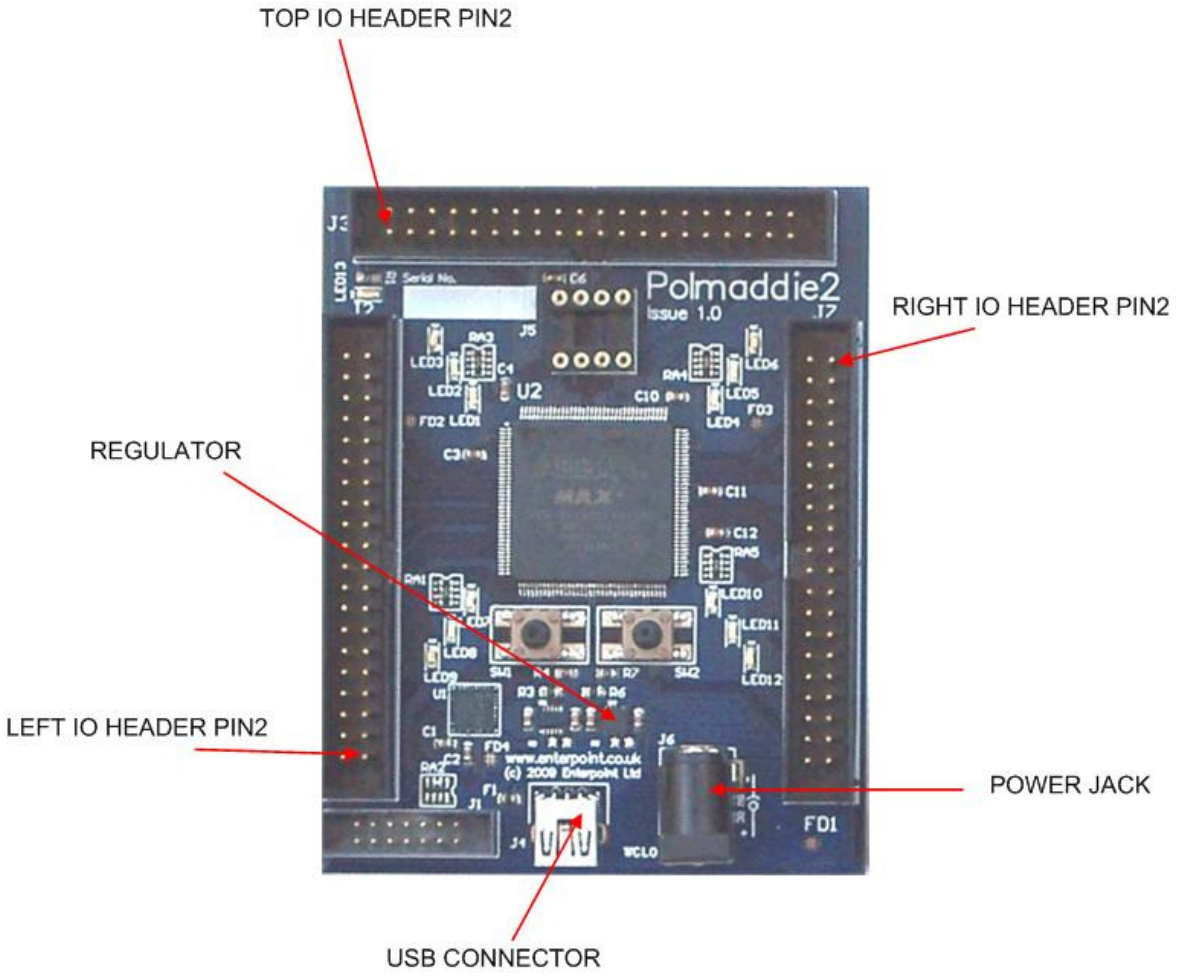


Figure 3 – Polmaddie2 Power Supply Features.

WARNING – THE REGULATOR MAY BECOME HOT IN NORMAL OPERATION ALONG WITH THE BOARDS THERMAL RELIEF. PLEASE DO NOT TOUCH OR PLACE HIGHLY FLAMABLE MATERIALS NEAR THESE DEVICES WHILST THE POLMADDIE2 BOARD IS IN OPERATION.

IO Headers

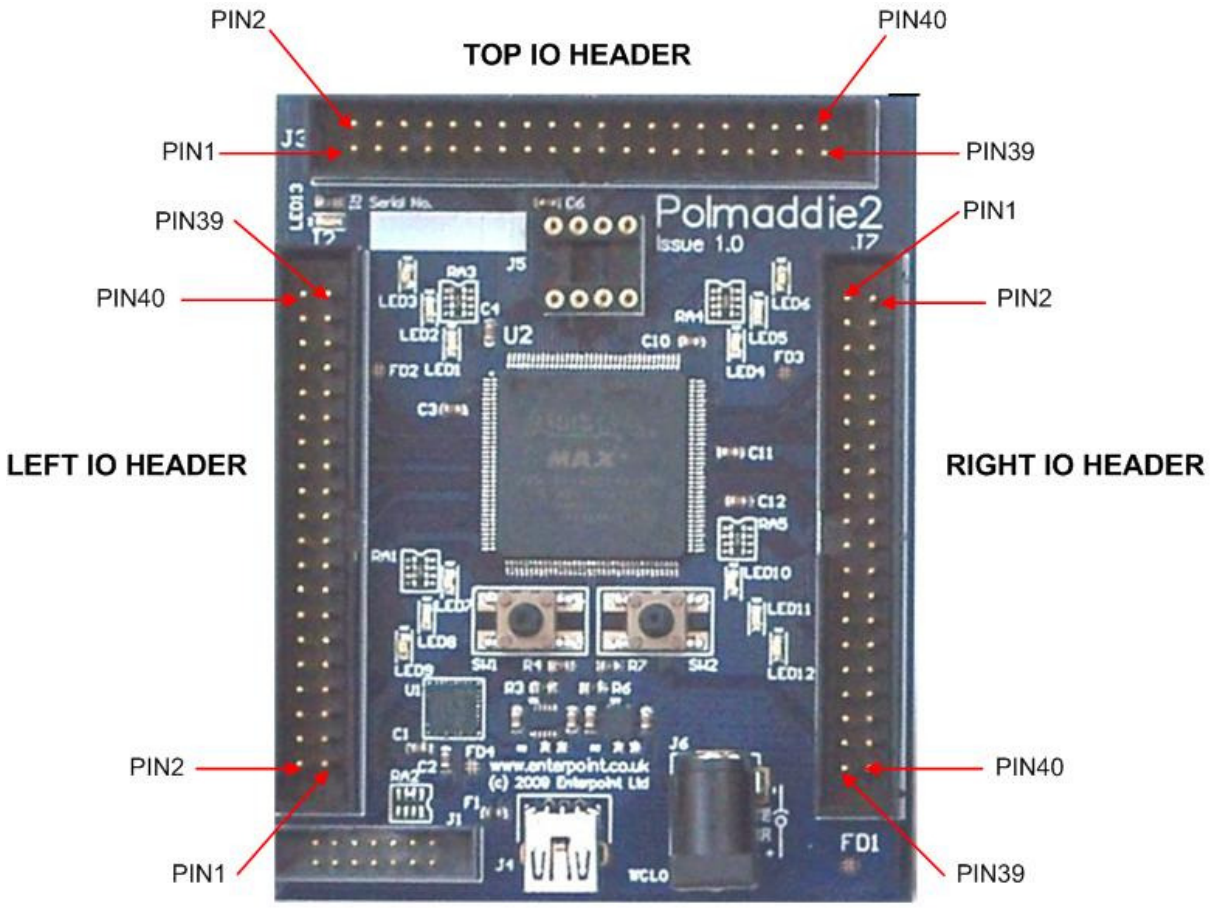


Figure 4 – Polmaddie2 Headers

The three 40-pin IDC Headers provide a simple mechanical and electrical interface for external signal inputs. The connectors on this header are on a 0.1inch (2.54mm), pitch and allow other electronic circuitry or user-designed add-on boards to be connected.

The headers each have 20 IOs routed to the CPLD. These are NOT 5V tolerant, the maximum input voltage should be limited to 3.3V. They each also have a permanent positive power pin on pin 2 and 19 permanent 0V connections as shown below:

LEFT HEADER					TOP HEADER					RIGHT HEADER				
PIN	USE	CPLD PIN	PIN	USE	PIN	USE	CPLD PIN	PIN	USE	PIN	USE	CPLD PIN	PIN	USE
1	IO40	37	2	3.3V	1	IO20	143	2	3.3V	1	IO60	102	2	3.3V
3	IO39	38	4	0V	3	IO19	142	4	0V	3	IO59	101	4	0V
5	IO38	32	6	0V	5	IO18	141	6	0V	5	IO58	100	6	0V
7	IO37	31	8	0V	7	IO17	140	8	0V	7	IO57	99	8	0V
9	IO36	30	10	0V	9	IO16	139	10	0V	9	IO56	98	10	0V
11	IO35	29	12	0V	11	IO15	138	12	0V	11	IO55	97	12	0V
13	IO34	28	14	0V	13	IO14	137	14	0V	13	IO54	96	14	0V
15	IO33	27	16	0V	15	IO13	136	16	0V	15	IO53	93	16	0V
17	IO32	25	18	0V	17	IO12	134	18	0V	17	IO52	92	18	0V
19	IO31	23	20	0V	19	IO11	133	20	0V	19	IO51	91	20	0V
21	IO30	22	22	0V	21	IO10	132	22	0V	21	IO50	88	22	0V
23	IO29	21	24	0V	23	IO9	131	24	0V	23	IO49	87	24	0V
25	IO28	18	26	0V	25	IO8	119	26	0V	25	IO48	86	26	0V
27	IO27	16	28	0V	27	IO7	118	28	0V	27	IO47	84	28	0V
29	IO26	15	30	0V	29	IO6	117	30	0V	29	IO46	83	30	0V
31	IO25	14	32	0V	31	IO5	116	32	0V	31	IO45	82	32	0V
33	IO24	11	34	0V	33	IO4	113	34	0V	33	IO44	81	34	0V
35	IO23	10	36	0V	35	IO3	112	36	0V	35	IO43	80	36	0V
37	IO22	9	38	0V	37	IO2	111	38	0V	37	IO42	72	38	0V
39	IO21	8	40	0V	39	IO1	110	40	0V	39	IO41	71	40	0V

CPLD

The main device on the Polmaddie2 is the Altera EPM3128ATI144-7. It has 128 macrocells.

OSCILLATOR

The single oscillator socket on Polmaddie2 supports a 3.3V, 8-pin DIL outline oscillator. This clock signal is routed directly through to the CPLD on **Pin 125**, which is a global clock input.

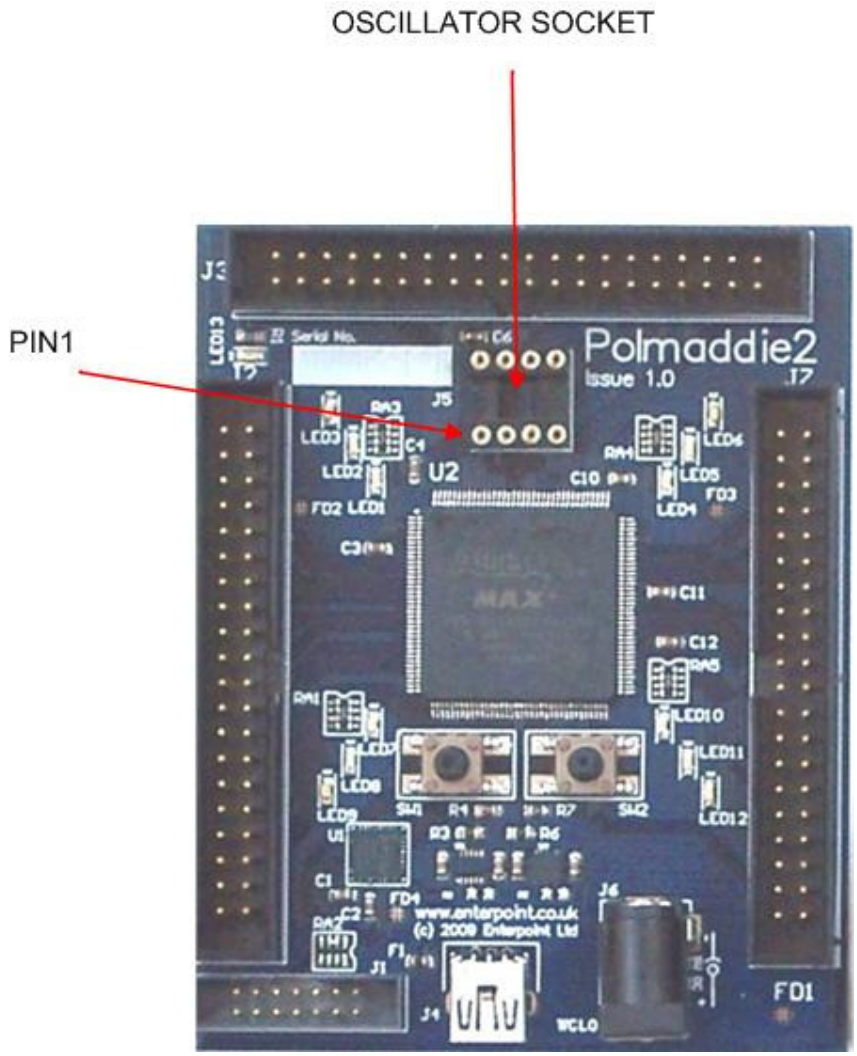


Figure 5 – Polmaddie2 Oscillator

LEDs

Polmaddie2 has 13 LEDs.

LED 13 is a green power indicator LED and indicates the presence of the 3.3V supply. It cannot be controlled by the CPLD.

LEDs 1 to 12 are arranged in 4 blocks of three, each block having one red, one orange and one green LED. This means they can be used to simulate traffic lights. They are all controlled by the CPLD. They connect to the CPLD as shown below:

LED	CPLD PIN	COLOUR	LED	CPLD PIN	COLOUR
LED1	7	GREEN	LED7	41	GREEN
LED2	6	ORANGE	LED8	40	ORANGE
LED3	5	RED	LED9	39	RED
LED4	106	GREEN	LED10	74	GREEN
LED5	107	ORANGE	LED11	78	ORANGE
LED6	109	RED	LED12	79	RED

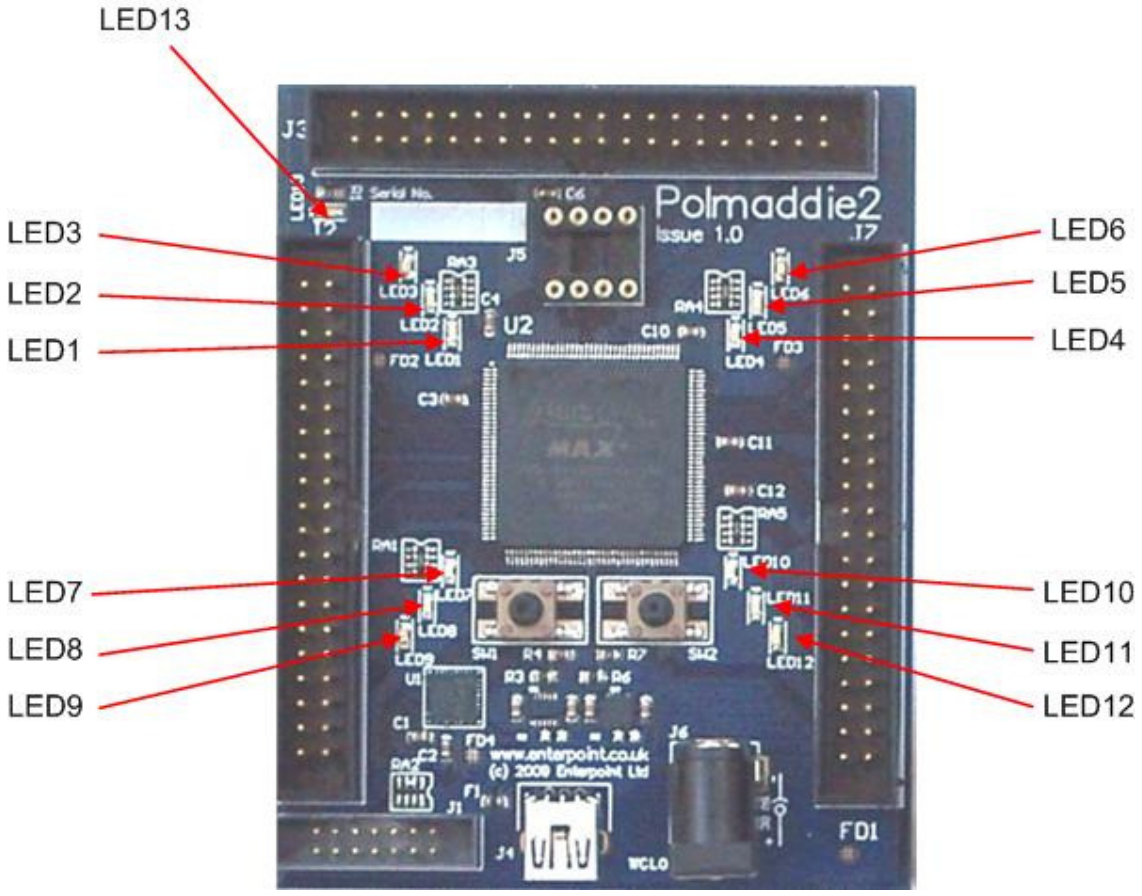


Figure 6 – Polmaddie2 LEDs

Switches

Polmaddie2 has two push button switches; to use these switches a back driven scanning pulse technique has to be used for these to be useful. This technique involves momentary driving the attached pin of the CPLD high for 1 clock pulse then examining the pin as an input to see if it is low. This process has to be repeated once every ¼ second.

The two switches are connected to the following IO pins:

SWITCH 1	SWITCH 2
54	67

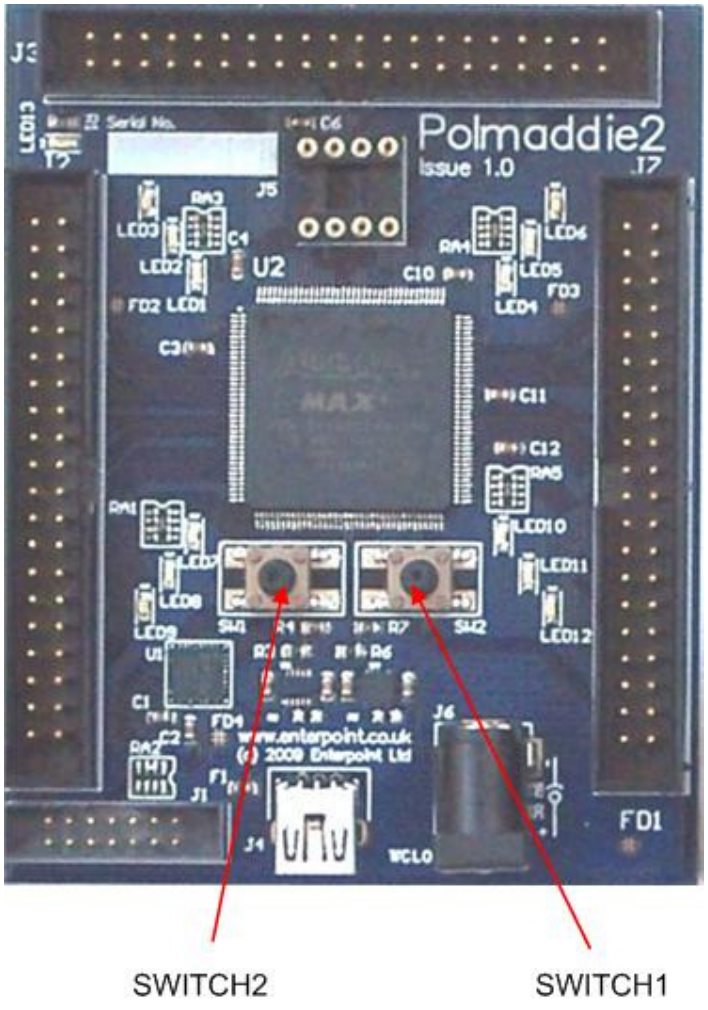


Figure 7 – Polmaddie2 Switches

USB Interface

The USB interface on the Polmaddie2 is achieved using an FT232R USB to serial UART interface. The datasheet and drivers for this device are available from http://www.ftdichip.com. When appropriate drivers are installed the Polmaddie2 USB port should be detected as a serial port. Alternative data optimised drivers are also available from FTDI.

The FT232R is connected to the CPLD and provided a simple UART, or other converter, is implemented then the data sent over the USB serial port can be used either as control and/or data information. This allows a host computer to act in a number of ways including system control and data storage functions.

The FT232R can also supply a clock to the CPLD using CBUS4 I/O. This I/O can be programmed by tools available from FTDI to output different frequencies or other functions. The FT232R can provide clock frequencies of 6/12/24/48MHz.

The connections between the USB device and the CPLD are shown below:

FT232R	CPLD PIN
CBUS4 (USB CLOCK)	128
CTS#	42
DCD#	44
DSR#	45
RI#	53
RTS#	60
DTR#	65
TXD	68
RXD	55

The FT232R connections CBUS0 to CBUS3 are routed via a resistor array site RA2 (resistor array not fitted) to the JTAG connector for future use in reconfiguring the CPLD via a USB interface, a scenario which is theoretically possible but not so far established. These connections, were the resistor array to be fitted, would be as shown below:

FT232R	JTAG SIGNAL
CBUS0	TMS
CBUS1	TCK
CBUS2	TDI
CBUS3	TDO

Programming Polmaddie2

The programming of the CPLD on Polmaddie2 can be achieved using the QuartusII programming tool.It is anticipated that a JTAG connection will be used in conjunction with this software. There is a single JTAG chain on Polmaddie2 which allows the programming of the CPLD.

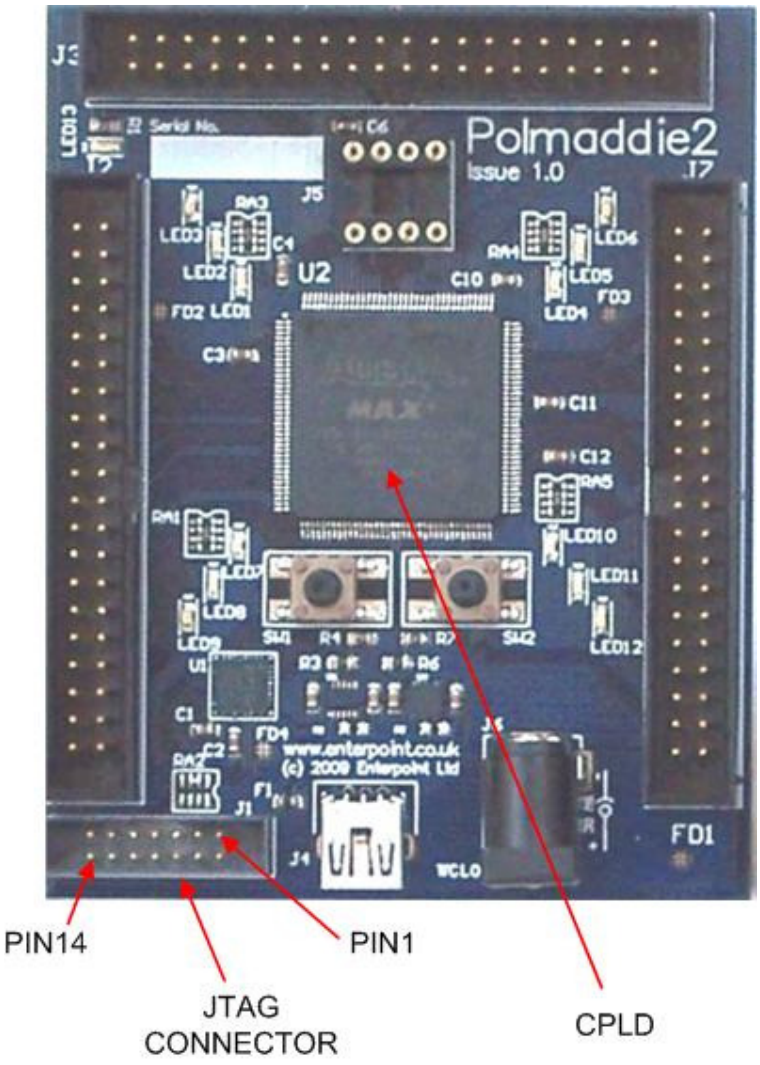


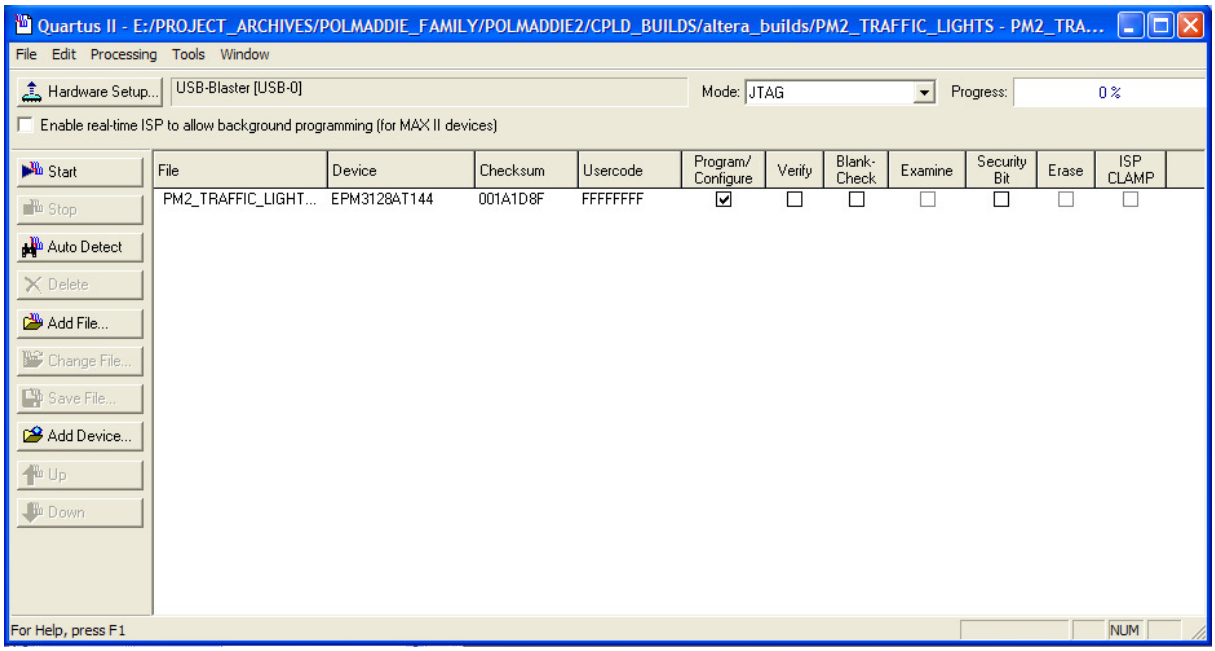
Figure 8– Polmaddie2 JTAG

The JTAG connector has a layout as follows:

GND	GND	GND	GND	GND	GND	GND (pin1)
NC (pin14)	NC	TDI	TDO	TCK	TMS	3.3V

Figure 9– Polmaddie2 JTAG CHAIN

Generation of suitable .pof files and control of the JTAG chain can be achieved using the QuartusII software. The Programming interface appears as shown below to program the CPL with the PM2 traffic lights program:



The Enterpoint PROG4 cable or an Altera USB Blaster programming cable can be used to program the Polmaddie2. The CPLD can be added manually or auto-detected by the software, so that the screen will appear as above. Checking the 'Program/Configure' box (as above) and then clicking 'Start' should initiate programming of the Polmaddie2.

Mechanical Arrangement

Dimensions are in millimetres. The three 40-way connectors are arranged on a 0.1 inch grid relative to eachother.

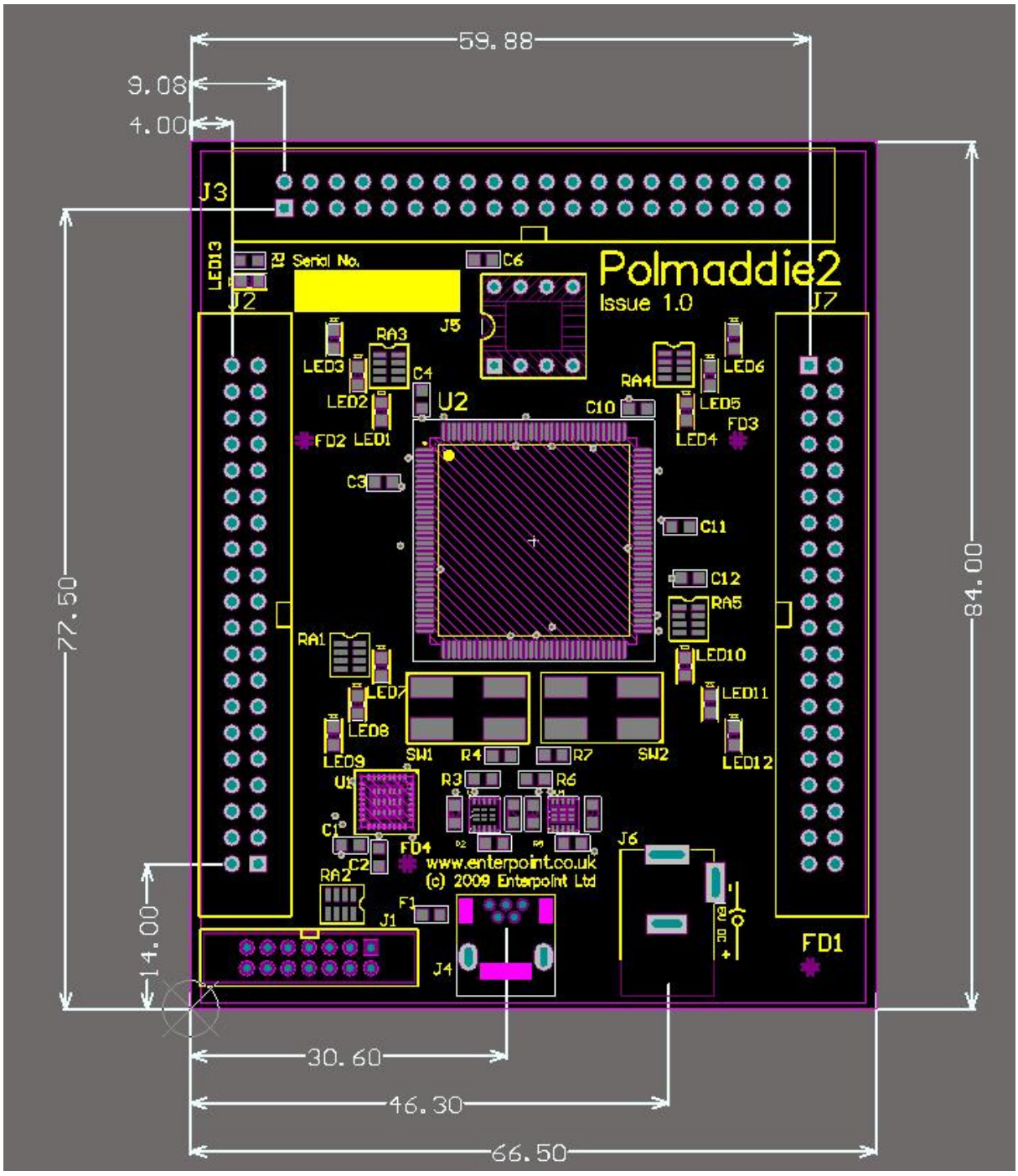


Figure 10– Polmaddie2 Mechanical Arrangement

Medical and Safety Critical Use

Polmaddie2 boards are not authorised for the use in, or use in the design of, medical or other safety critical systems without the express written person of the Board of Enterpoint. If such use is allowed the said use will be entirely the responsibility of the user. Enterpoint Ltd will accepts no liability for any failure or defect of the Polmaddie2 board, or its design, when it is used in any medical or safety critical application

Warranty

Polmaddie2 comes with a 90 return to base warranty. Enterpoint reserves the right not honour a warranty if the failure is due to maltreatment of the Polmaddie2 board.

Outside the warranty period Enterpoint offers a fixed price repair or replacement service. We reserve the right not to offer this service where a Polmaddie2 has been maltreated or otherwise deliberately damaged. Please contact support if need to use this service.

Other specialised warranty programs can be offered to users of multiple Enterpoint products. Please contact sales on boardsales@enterpoint.co.uk if you are interested in these types of warranty,

Support

Enterpoint offers support during normal United Kingdom working hours 9.00am to 5.00pm. Please examine our Polmaddie2 FAQ web page and the contents of this manual before raising a support query. We can be contacted as follows:

Telephone - +44 (0) 121 288 3945
Email - support@enterpoint.co.uk